

wetlands must be protected from damage caused by nutrient overloading. They appear to function well in removing modest amounts of nutrients, for example below properly-functioning wastewater treatment plants. However, heavier loads may exceed their removal capacity, allowing nutrients to continue downstream, and imposition of such excessive loads may adversely change the wetland itself. The methods and data from this study may help development of relatively inexpensive methods for assessing wetland nutrient-removal abilities so that year-to-year changes in removal efficiency of many streams can be determined.

Research Recommendations:

Additional research is needed regarding the relationships between nutrient loading and wetland functioning. One study which should be undertaken is measurement of the amount of change and potential damage to wetlands by municipal wastewater loads. It is likely that the additional nutrients, and in many cases the constant minimum stream flows, delivered by the effluent will affect plant species composition. Physical and chemical changes attributable to the effluent probably also markedly affect the soil fauna, microbial populations, and perhaps vegetative structure, especially close below the outfall. A study of the rate of accumulation of phosphorus and other elements in the soils and biota below the outfall would be of particular value. How long does it take under given waste loads for the soil to become so rich in these elements that further removal ceases? Studies are also recommended having to do with land use in the watershed. For example, does increased concentration of suspended sediments from soil erosion increase or decrease the efficiency of removal of phosphorus and other elements from wastewater? How does logging of bottomland timber affect trapping of nutrients from agricultural and municipal sources? Finally, incorporation of the results into models of nutrient flux from the watershed to the estuaries will help predict maximum permissible wastewater discharges which do not damage swamp functioning, thereby protecting estuarine water quality while urbanization of the Coastal Plain is increasing. Studies such as these will ultimately aid in making management decisions regarding the importance of wetlands to water quality.